

→ Assessing agri-environmental impacts in the French West Indies and French Guiana

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¹Spot Image, ²CIRAD, ³SIGbea, ⁴IRD
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→ PARAGE :

Assessing Agri-Environmental impacts in the French West Indies and French Guiana :

A space-based tool for assessing environmental impacts

- Innovative study on the evaluation of the impact of farming practices on natural environment
- Project co-funded by the French ministry of agriculture and fisheries
- 2 years project : March 20, 2006 – March 27, 2008



→ Project objectives

- **To evaluate the contribution of remote sensing technology for the agri-environment diagnosis in the French West Indies and French Guiana**
 - Support for the creation and updating of agricultural and natural land cover maps
 - Support for the set up of regulations regarding natural resources and territorial management
 - Risk assessment and monitoring
- **To strengthen cooperation between users**
 - Sharing of geographic information
- **To demonstrate the contribution of the SPOT satellite image receiving station set up in French Guiana in Feb 2006**



→ 3 regions with different issue

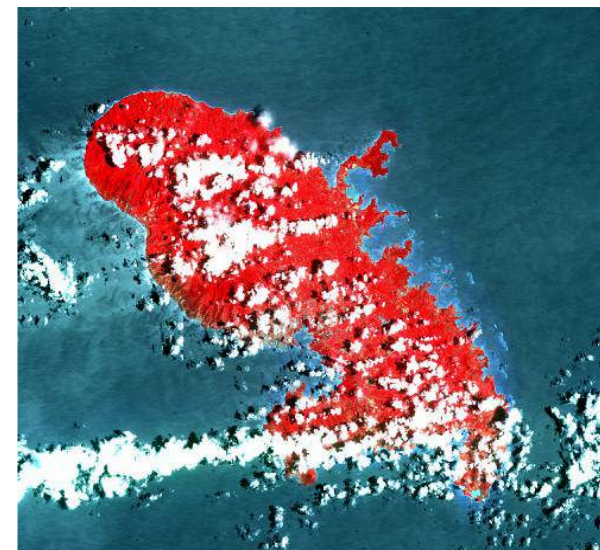


French Guiana

Deforestation monitoring for slash-and-burn agriculture

Guadeloupe

Evaluation of agricultural pressure over sensitive or protected environments



Martinique

Soil erosion risk assessment on the "Baie du Robert" watershed

→ Geo-indicators to answer users needs

- Synthetic vision of a problem in order to better understand it
- Based on reliable and easily accessible data
- Sensitive to expected changes
- Understood and accepted by its users
- Meet spatial criteria (calculated from spatial data)
- Answer agri-environmental issues

=> Focus on the spatial relationships that exist between a parcel and its environment

→ Aim

- To provide non GIS specialists with a simple tool to assess agri-environmental issues
- To ease the exchange & share of information between users
- To implement the geo-indicators and enhance their dynamic nature
- To disseminate the map products derived from satellite image processing

→ Selected technologies

■ Open Source

- Database : POSTGIS
- Map Server : Geoserver
- Interface : OpenLayers



■ Meeting with OGC standards

- WMS, WFS, SLD & compatibility  future standards, WPS



■ Customisable

- Interface
- Geo-Indicators



PARAGE

Occupation Agricole dans les Régions Antilles et Guyane :
Un support spatialisé pour l'évaluation de son impact environnemental



Login :

Mot de Passe :

Entrer

Annuler



Financement : 50 % Ministère de l'Agriculture et de la Pêche, 50 % Spot Image, IRD, CIRAD, SIGbea



→ Issue & Study site:

- Soil erosion risk assessment on the “Baie du Robert” watershed

→ Geo-indicator: « Soil sensitivity to erosion »

- Adapting the PRAM-Cemagref soil erosion risk assessment model
 - 4 layers of information :
 - Land cover
 - Slope
 - Run-off accumulation
 - Soil condition
 - Calculation of a sensitivity index according to a decision-tree

→ Map products:

- Land cover map
- Slope map
- Slope length map
- Soil map



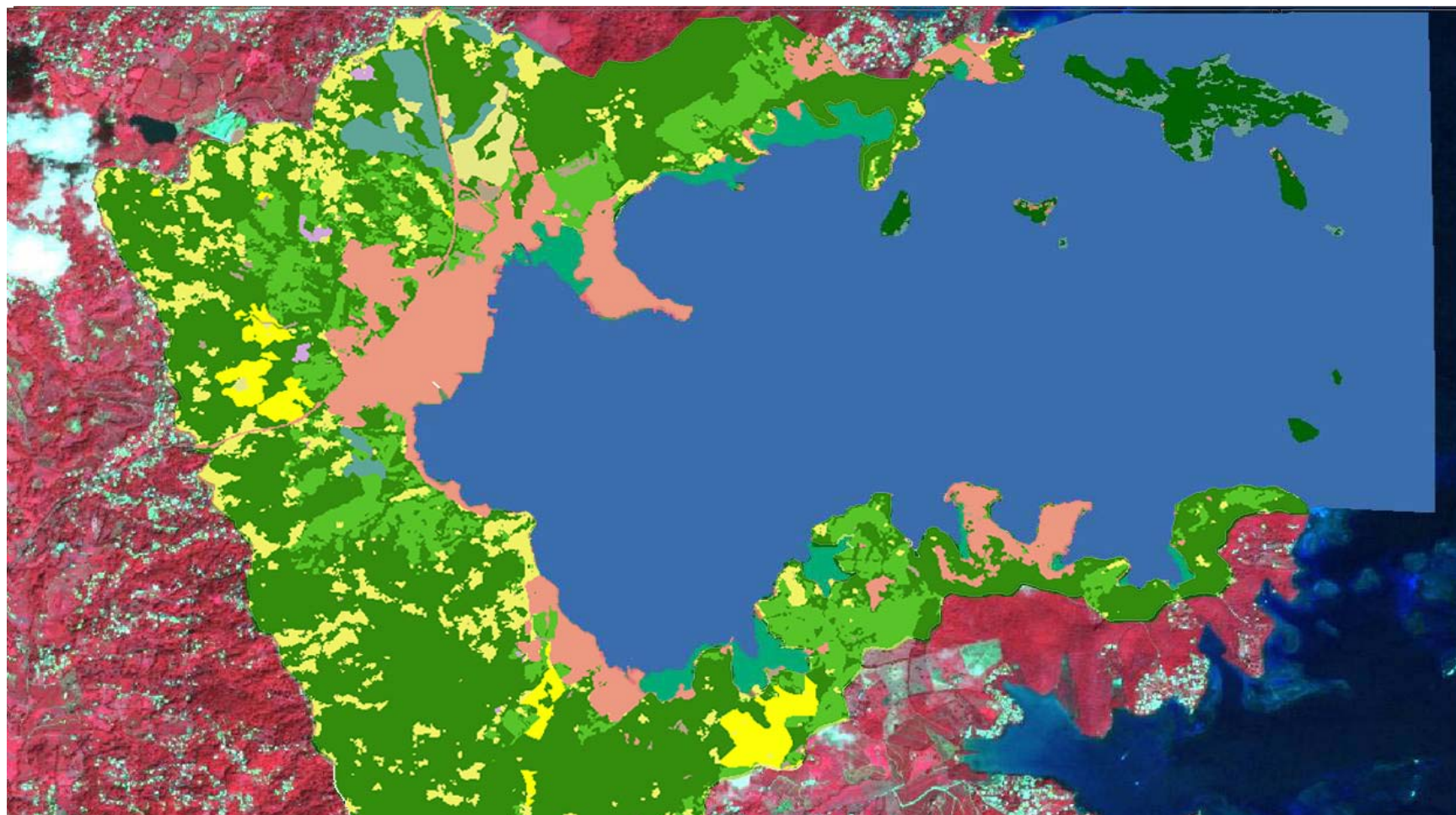


**SPOT image from
14-Nov-2006**

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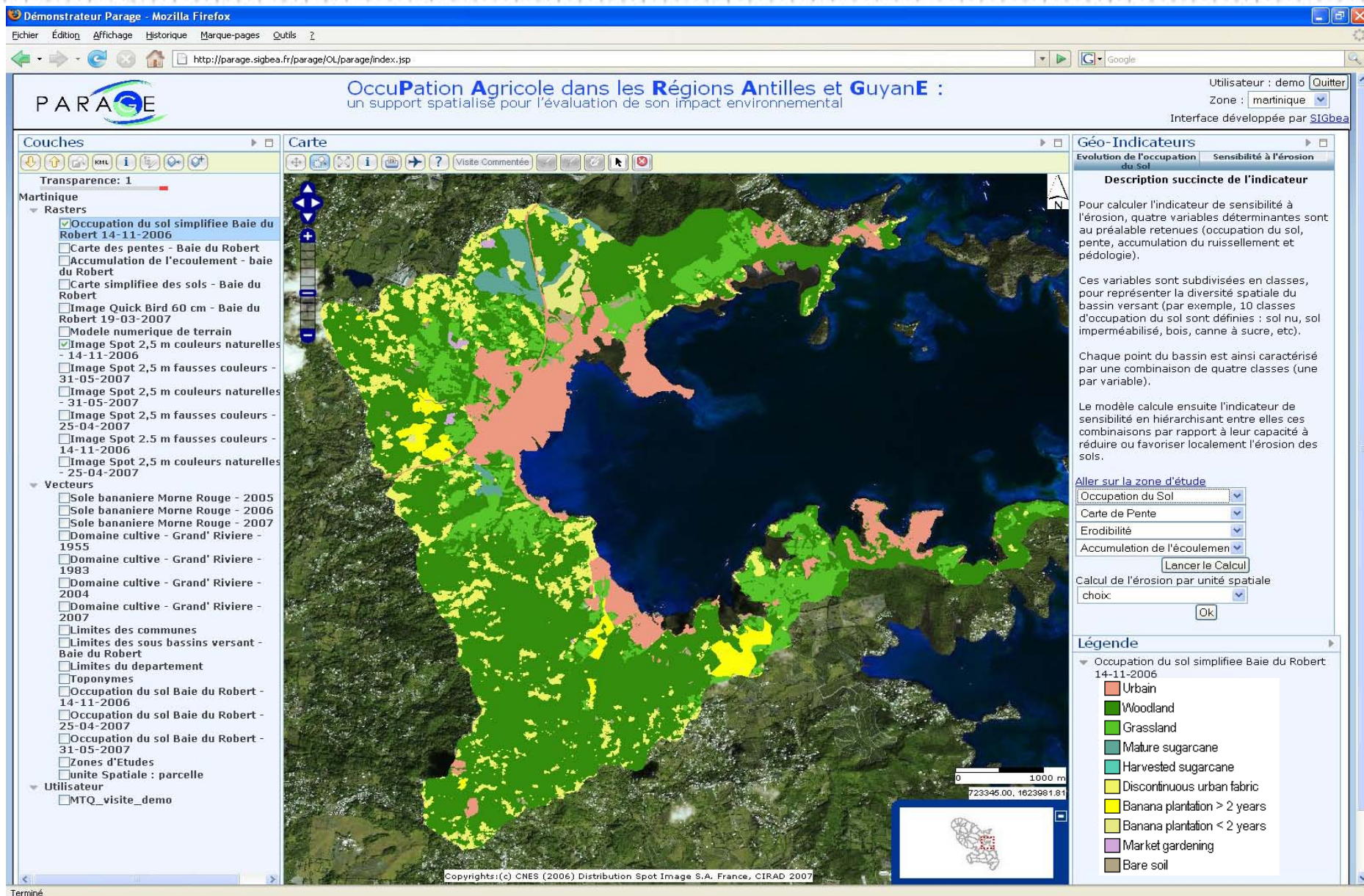
→ Satellite image classification (14-Nov-2006) simplified



- Urban
- Woodland
- Grassland
- Mature sugarcane
- Harvested sugarcane
- Discontinuous urban fabric
- Banana plantation > 2 years
- Banana plantation < 2 years
- Market gardening
- Bare soil

Processing CIRAD

=> Integrated in the GIS prototype for Geo-Indicator calculation...



Démonstrateur Parage - Mozilla Firefox

Fichier Édition Affichage Historique Marque-pages Outils ?

http://parage.sigbea.fr/parage/OL/parage/index.jsp

PARAGE

OccuPation Agricole dans les Régions Antilles et Guyane :
un support spatialisé pour l'évaluation de son impact environnemental

Utilisateur : demo Quitter

Zone : martinique

Interface développée par SIGbea

Couches

Transparence: 1

Martinique

Rasters

- ☒ Sensibilité a l'érosion
- ☒ Occupation du sol simplifiée Baie du Robert 14-11-2006
- ☐ Carte des pentes - Baie du Robert
- ☐ Accumulation de l'écoulement - baie du Robert
- ☐ Carte simplifiée des sols - Baie du Robert
- ☐ Image Quick Bird 60 cm - Baie du Robert 19-03-2007
- ☐ Modèle numérique de terrain
- ☒ Image Spot 2,5 m couleurs naturelles - 14-11-2006
- ☐ Image Spot 2,5 m fausses couleurs - 31-05-2007
- ☐ Image Spot 2,5 m couleurs naturelles - 31-05-2007
- ☐ Image Spot 2,5 m fausses couleurs - 25-04-2007
- ☐ Image Spot 2,5 m fausses couleurs - 14-11-2006
- ☐ Image Spot 2,5 m couleurs naturelles - 25-04-2007

Vecteurs

- ☐ Sole bananière Morne Rouge - 2005
- ☐ Sole bananière Morne Rouge - 2006
- ☐ Sole bananière Morne Rouge - 2007
- ☐ Domaine cultive - Grand' Rivière - 1955
- ☐ Domaine cultive - Grand' Rivière - 1983
- ☐ Domaine cultive - Grand' Rivière - 2004
- ☐ Domaine cultive - Grand' Rivière - 2007
- ☐ Limites des communes
- ☐ Limites des sous bassins versant - Baie du Robert
- ☐ Limites du département
- ☐ Toponymes
- ☐ Occupation du sol Baie du Robert - 14-11-2006
- ☐ Occupation du sol Baie du Robert - 25-04-2007
- ☐ Occupation du sol Baie du Robert - 31-05-2007
- ☒ Zones d'Etudes
- ☐ Unité Spatiale : parcelle

Utilisateur

- ☐ MTQ_visite_demo

Carte

Géo-Indicateurs

Evolution de l'occupation du sol

Sensibilité à l'érosion

Description succincte de l'indicateur

Pour calculer l'indicateur de sensibilité à l'érosion, quatre variables déterminantes sont au préalable retenues (occupation du sol, pente, accumulation du ruissellement et pédologie).

Ces variables sont subdivisées en classes, pour représenter la diversité spatiale du bassin versant (par exemple, 10 classes d'occupation du sol sont définies : sol nu, sol imperméabilisé, bois, canne à sucre, etc).

Chaque point du bassin est ainsi caractérisé par une combinaison de quatre classes (une par variable).

Le modèle calcule ensuite l'indicateur de sensibilité en hiérarchisant entre elles ces combinaisons par rapport à leur capacité à réduire ou favoriser localement l'érosion des sols.

Aller sur la zone d'étude

Occupation du Sol

Carte de Pente

Erodibilité

Accumulation de l'écoulemen

Lancer le Calcul

Calcul de l'érosion par unité spatiale

choix:

Ok

Légende

- Occupation du sol simplifiée Baie du Robert 14-11-2006
- Sensibilité a l'érosion
 - Nulle
 - Tres Faible
 - Faible
 - Moyenne
 - Forte
 - Tres Forte
 - Maximale

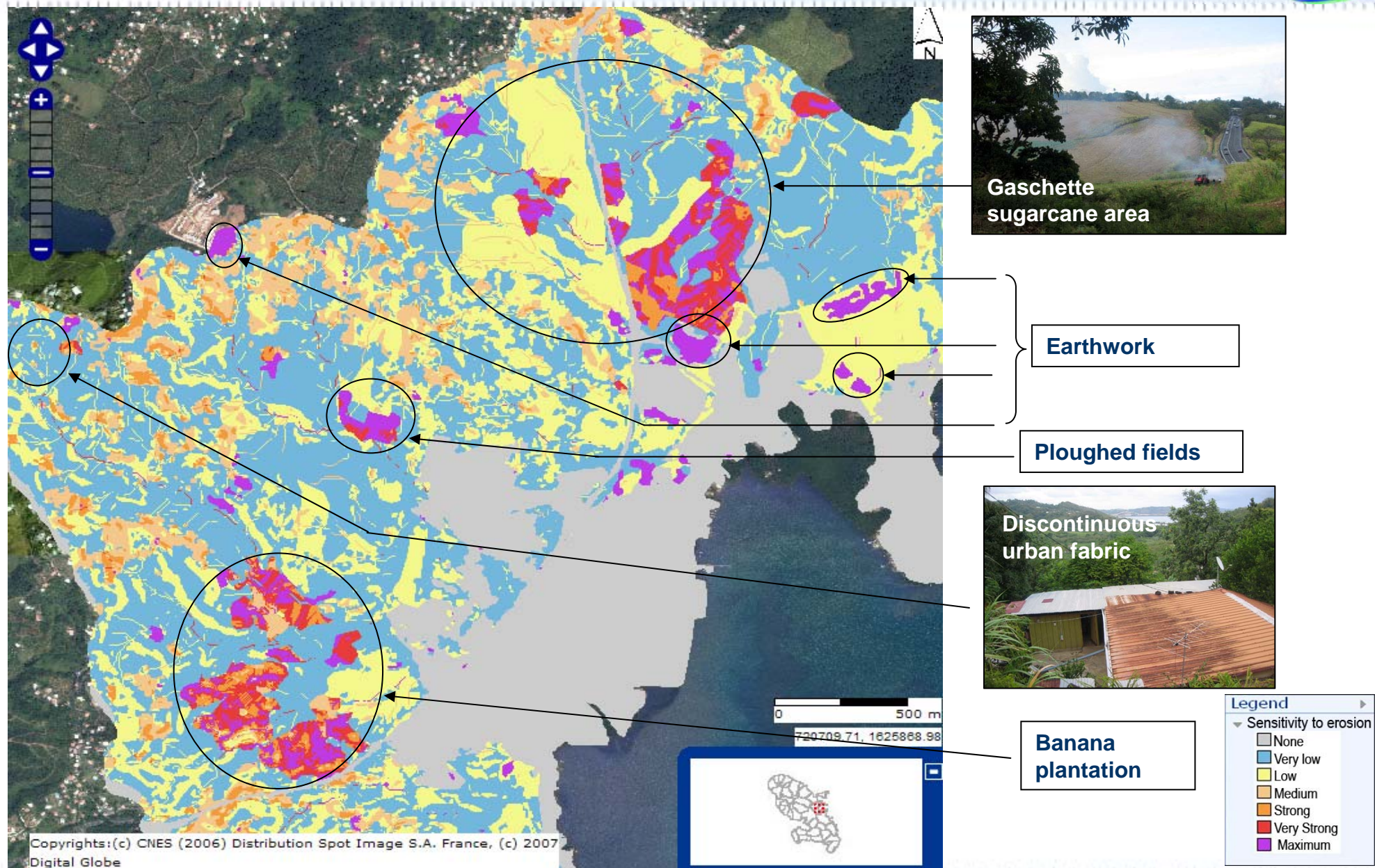
Legend

- Sensitivity to erosion
 - None
 - Very low
 - Low
 - Medium
 - Strong
 - Very Strong
 - Maximum

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Terminé

Martinique: Geolnd. calculation - Details (1)





→ Issue & Study site:

■ Evaluation of the agricultural pressure over sensitive or protected environments

- Grand Cul-de-Sac Marin nature reserve (coastal wetland vegetation)

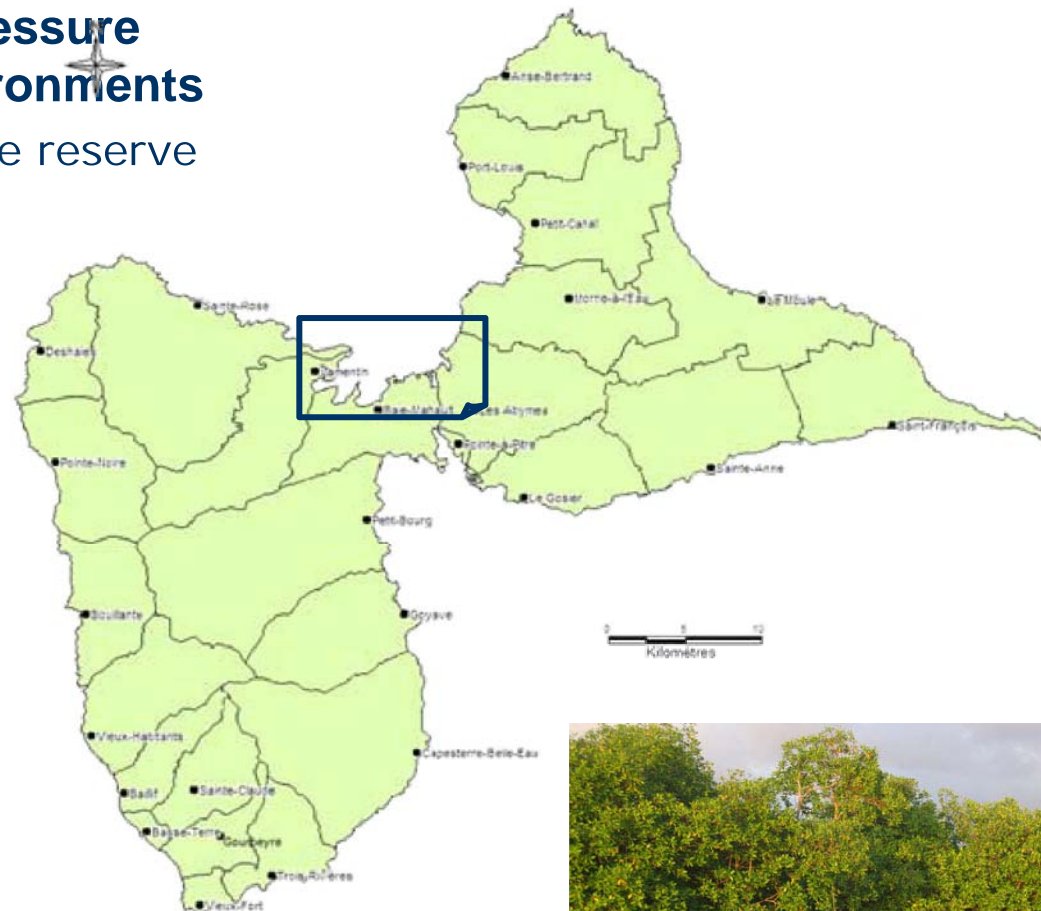
⇒ Geo-indicator:

« Landscape evolution »

- assessment of changes in land cover between 2 or more dates

→ Map products:

- Land cover map





**SPOT image from
20-Dec-2006**

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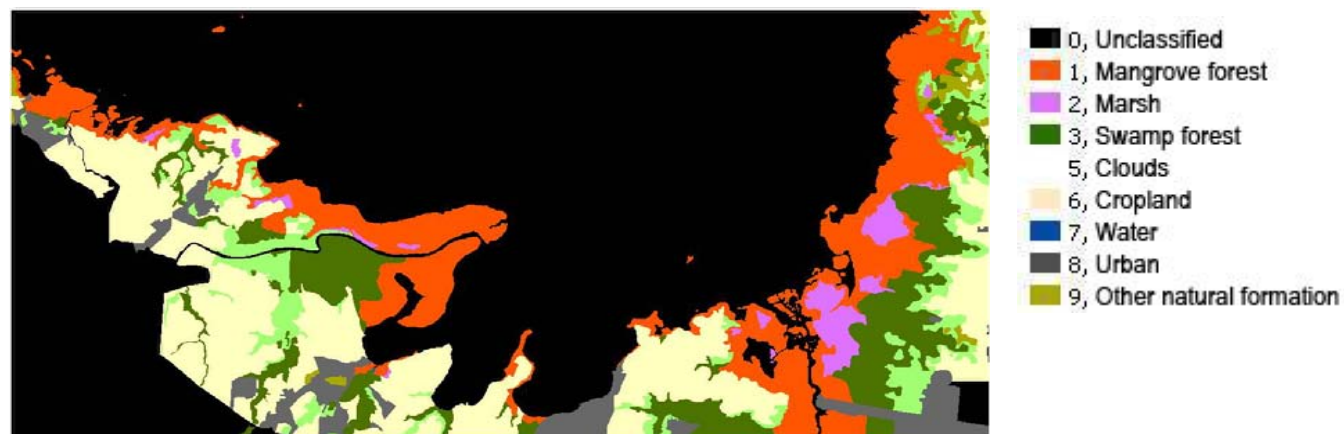


→ History map nomenclature harmonisation

■ Wetlands DGRST 1989

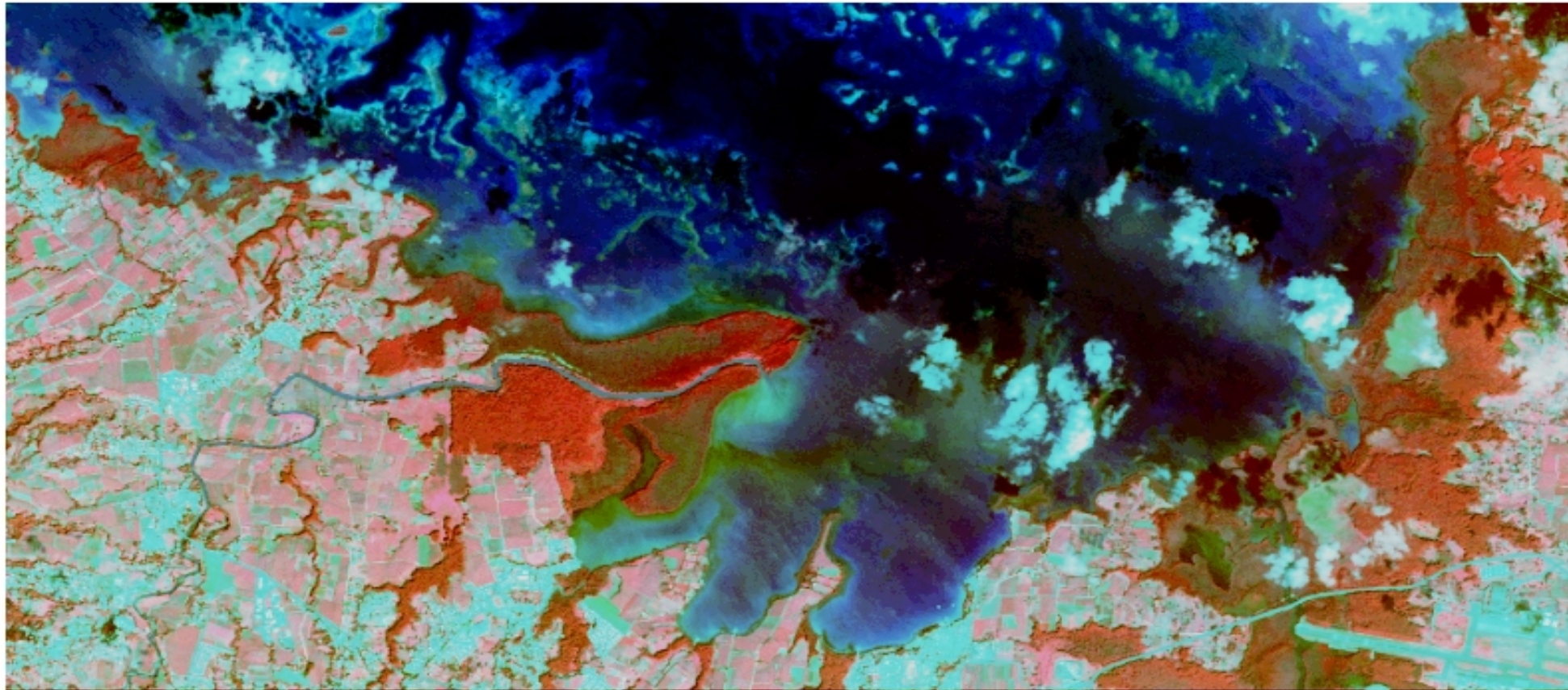


■ Wetlands ONF 1995



=> Integrated in the GIS prototype for Geo-Indicator calculation...

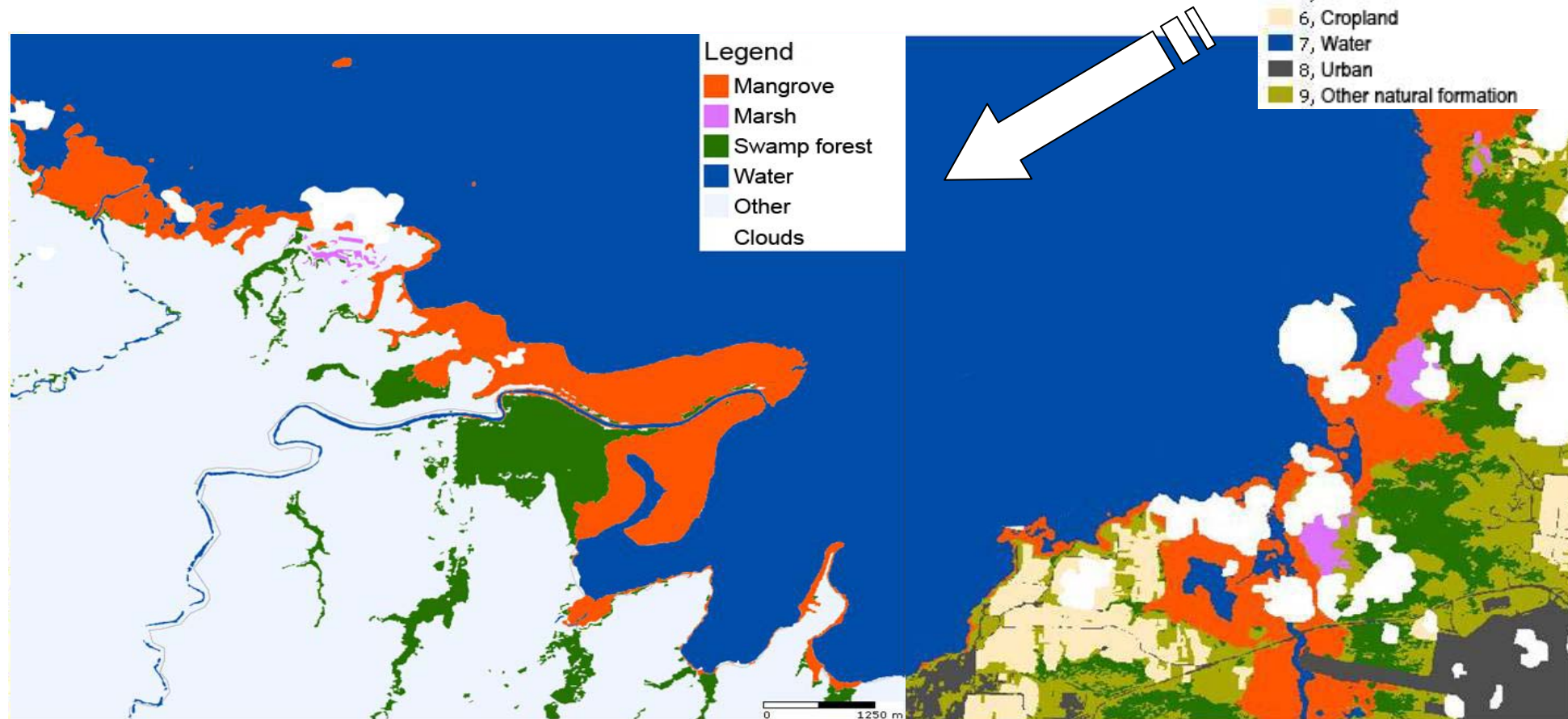
→ SPOT satellite image classification (20-Dec-2006)



Standard color composite (PIR-R-G)

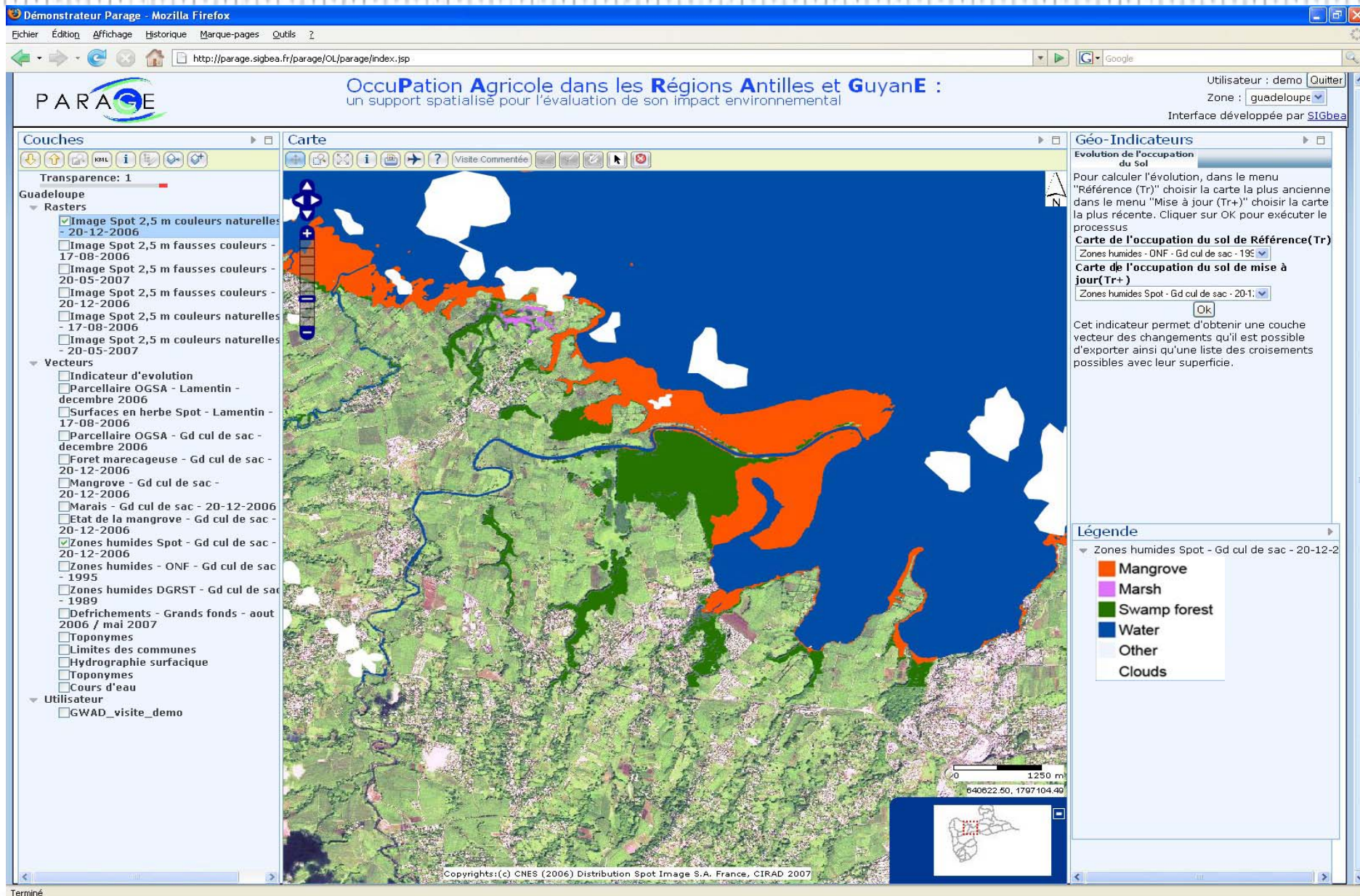
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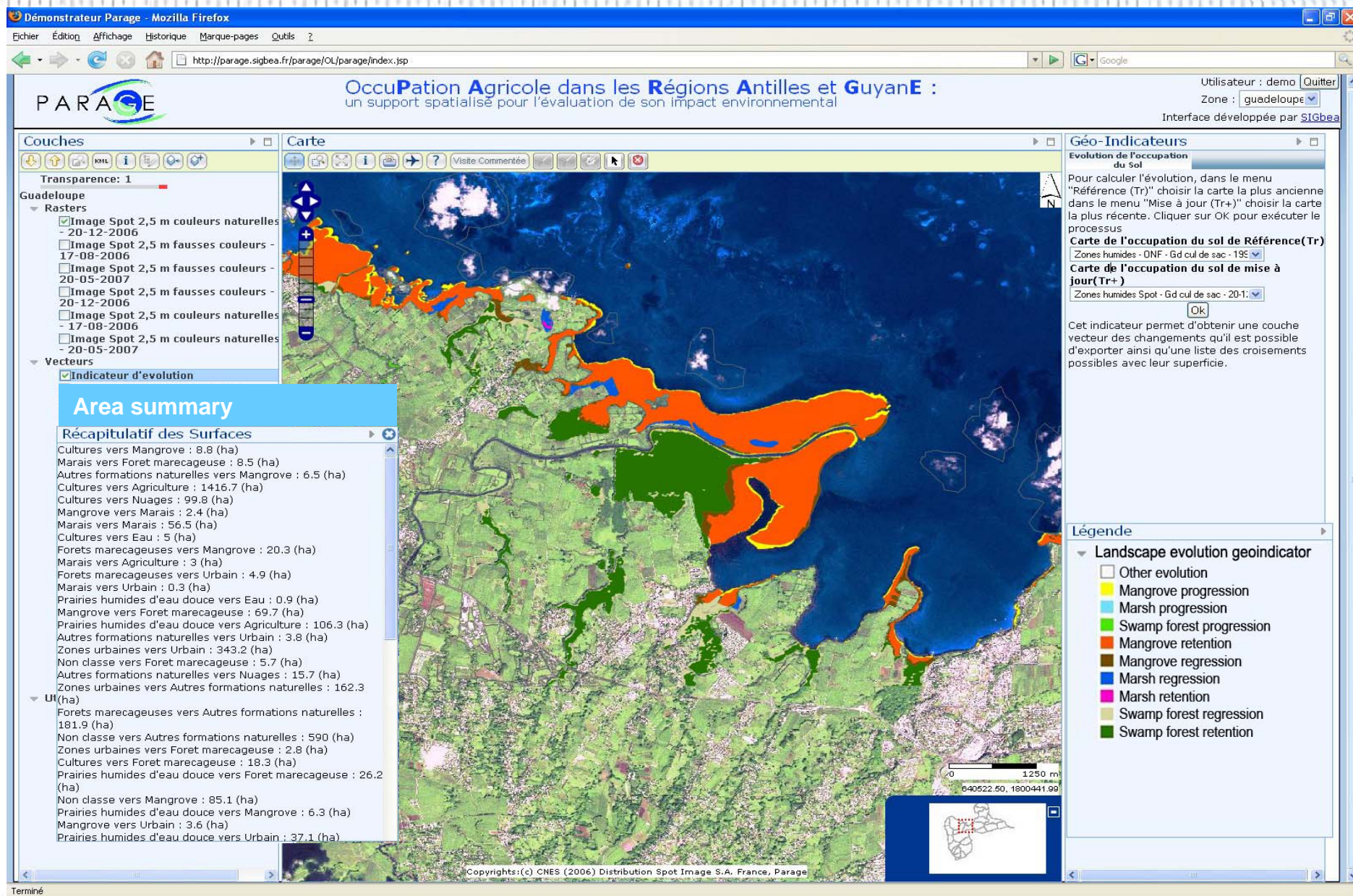
→ SPOT satellite image classification (20-Dec-2006) harmonised nomenclature



Processing CIRAD

=> Integrated in the GIS prototype for Geo-Indicator calculation...







→ Issue & Study Site:

- Deforestation monitoring
- Traditional slash-and-burn agriculture
 - Uncontrolled clearance
 - UAA tripled in 20 years
- Saint-Laurent / Apatou road under construction

⇒ Geo-indicator:

“Landscape evolution”

- assessment of changes in land cover/use between 2 or more dates

→ Map products:

- Land cover map
- Land use map



www.guyanecho.com, auteur : M. MORACCHINI



www.guyanecho.com, auteur : D. PAYEUR

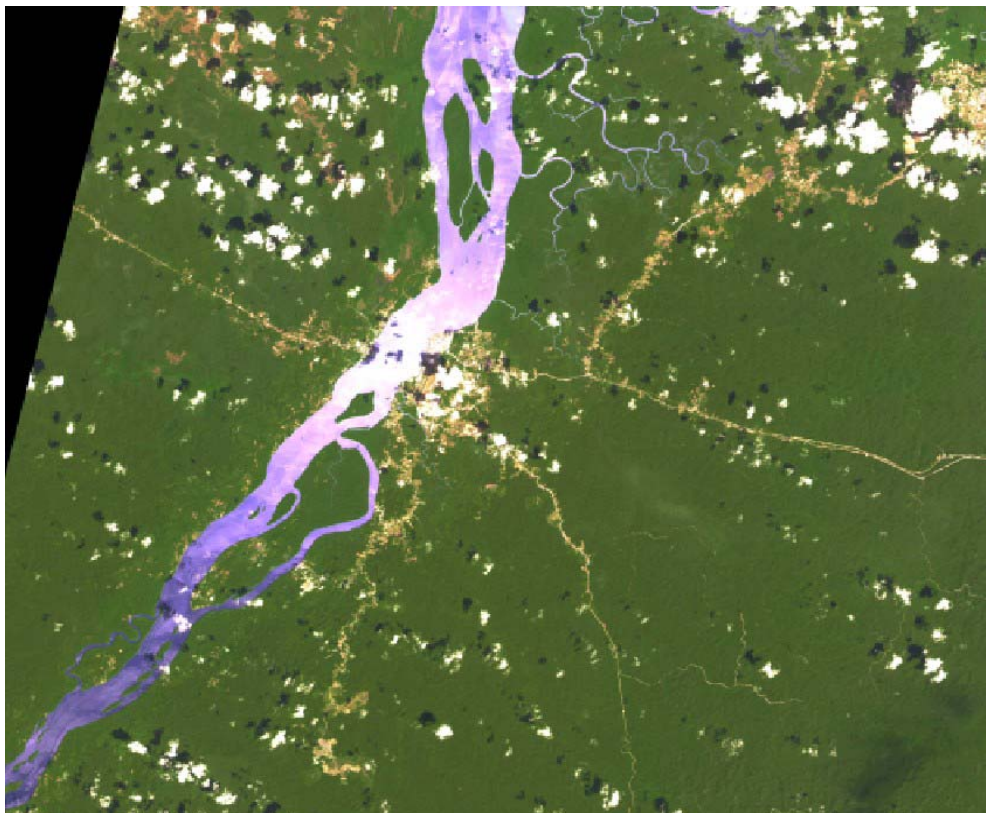


**SPOT Image from
du 05-Oct-2006**

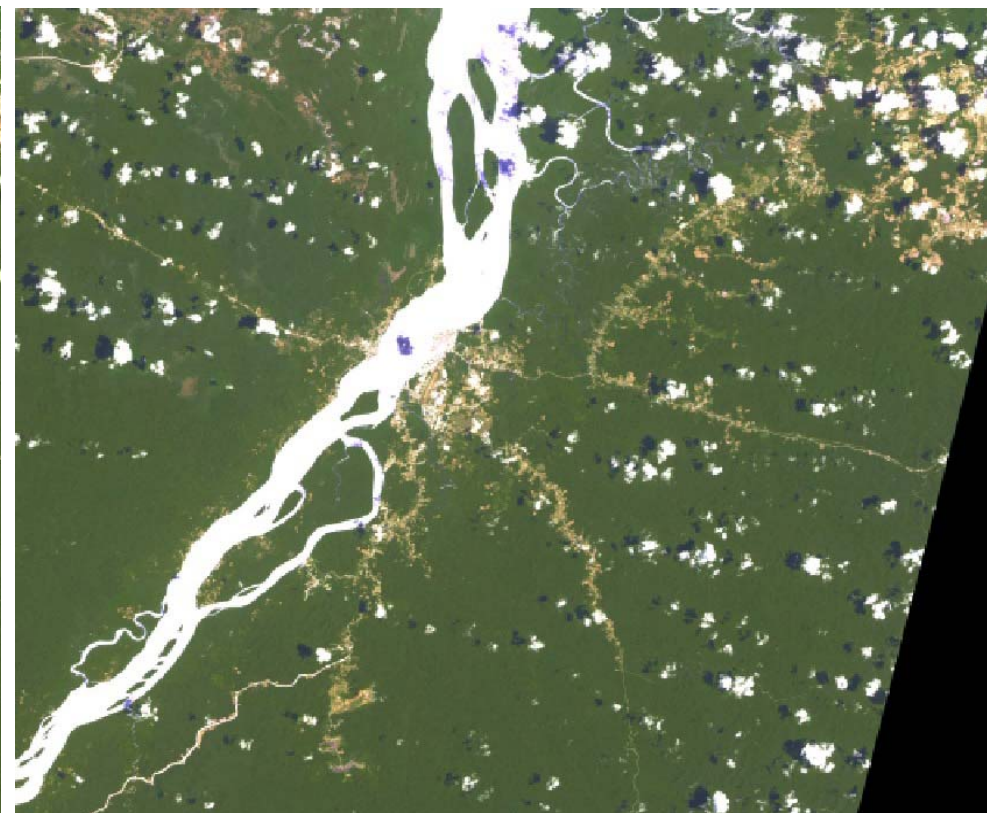
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→ SPOT satellite image classification



SPOT – November 26th, 1999

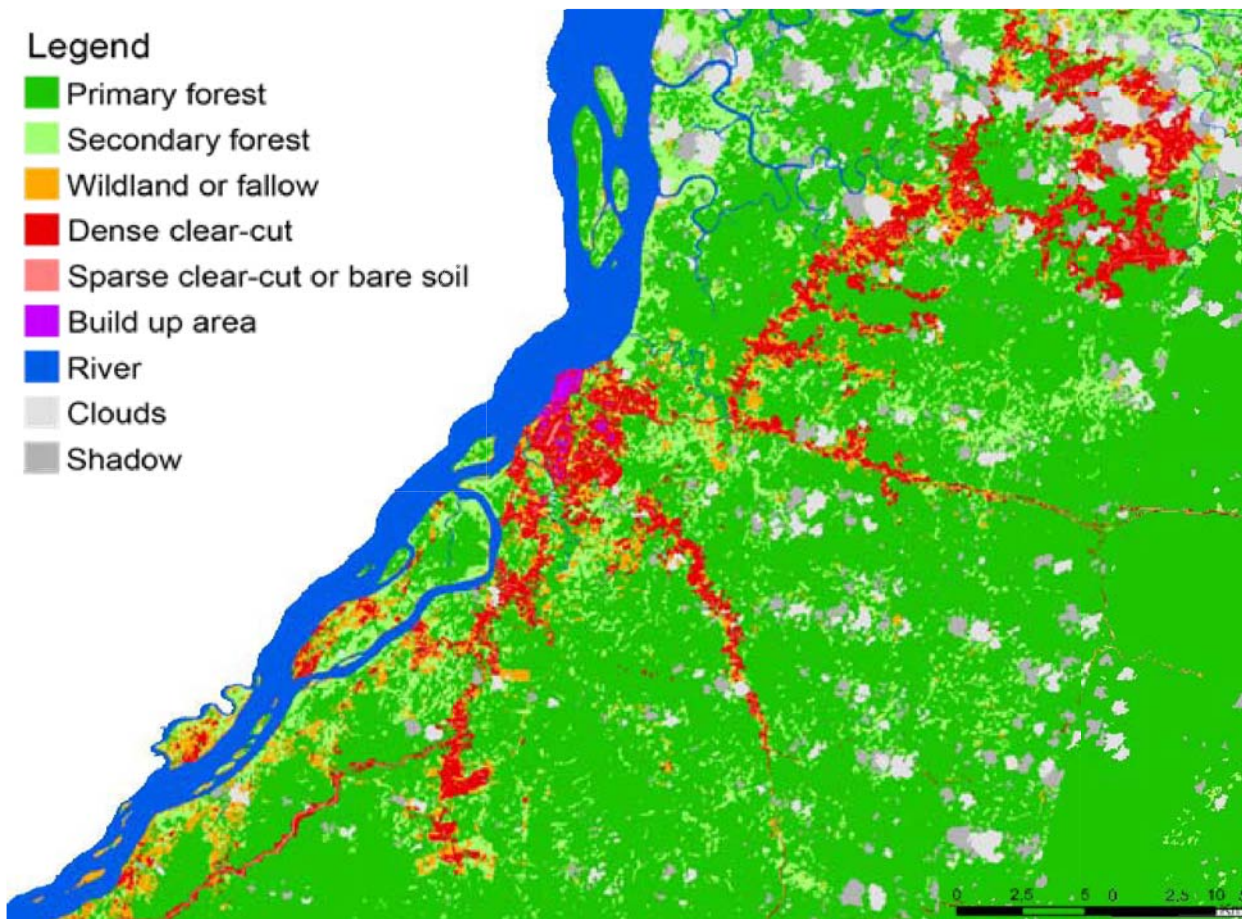


SPOT – September 26th, 2006

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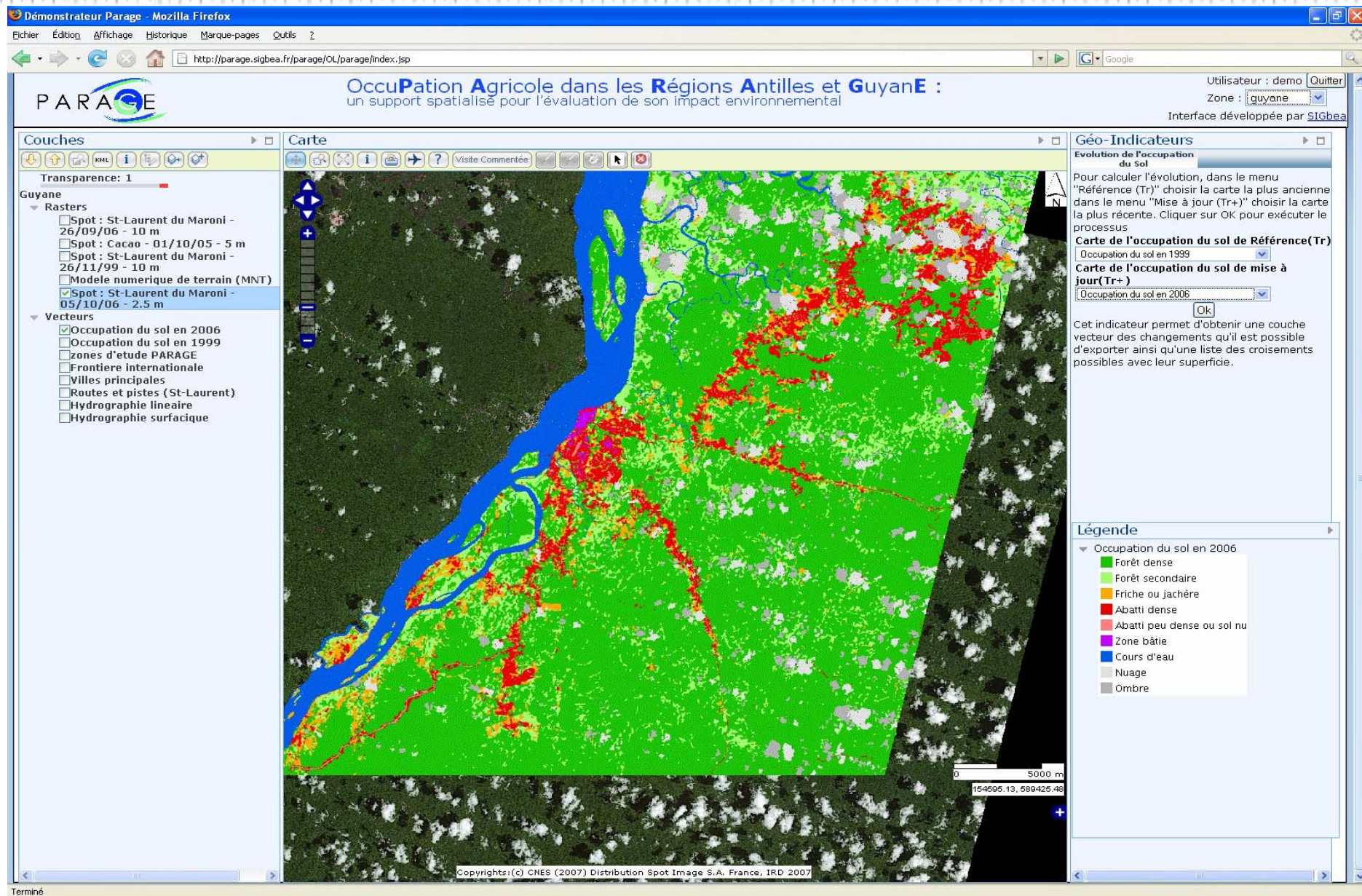
→ SPOT satellite image classification

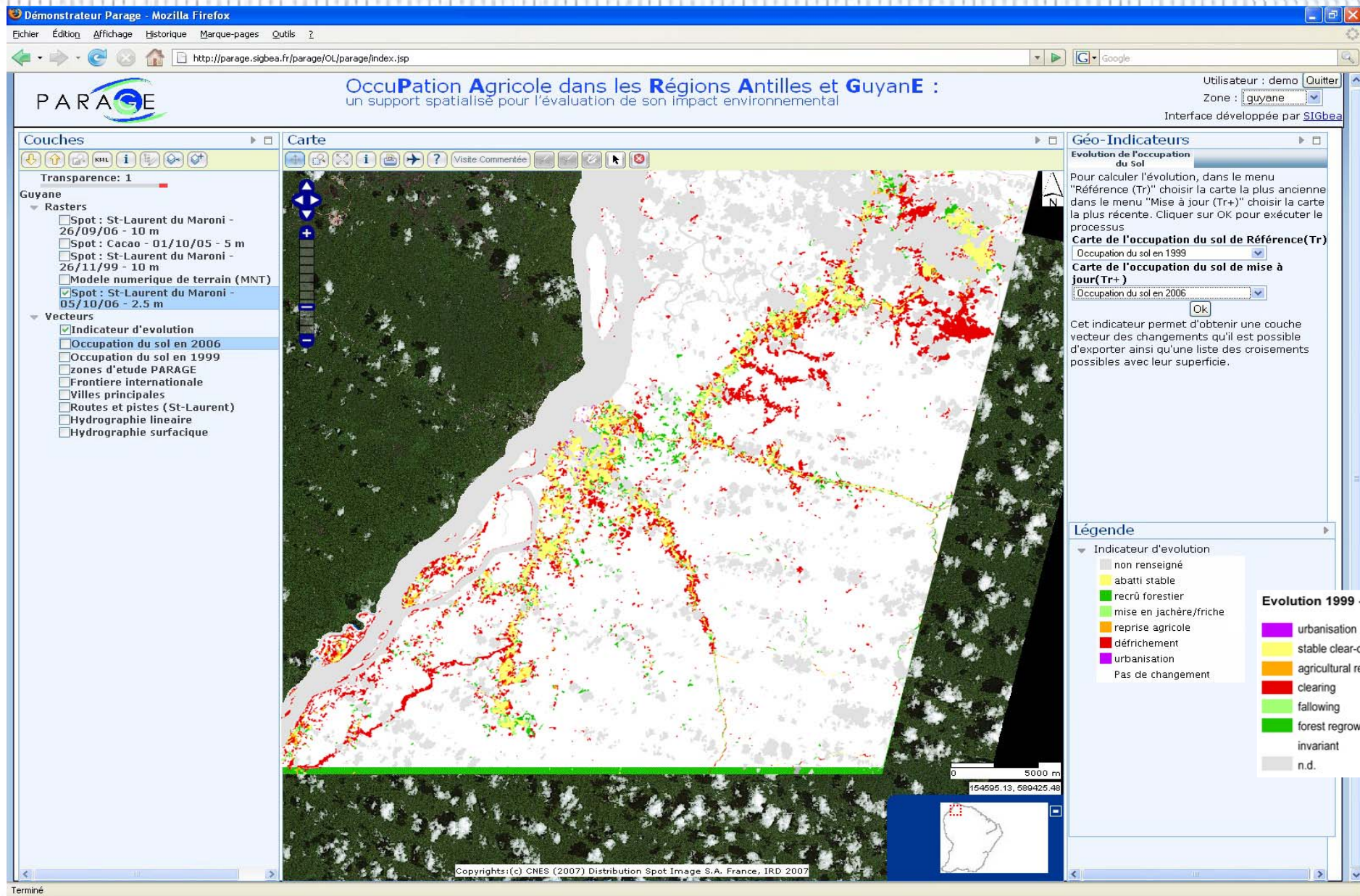


Processing IRD

Land cover map 2006

=> Integrated in the GIS prototype for Geo-Indicator calculation...





→ Conclusion (user evaluation)

■ Map products and Geo-indicators

- useful information for territory knowledge diagnosis and monitoring
- map products and Geo-indicators can be updated regularly (satellite based)
- methodology applicable in other territories

■ GIS prototype

- Web & open source => no need for install
- from GIS experts to general public
- simple communication tool
- information sharing and dissemination

■ Limits

- available internet bit rate
- climatic conditions
- market gardening or crops under shade issues



⇒ Towards an operational service

- Geographic extension
- Product standardisation
- Tool robustness





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